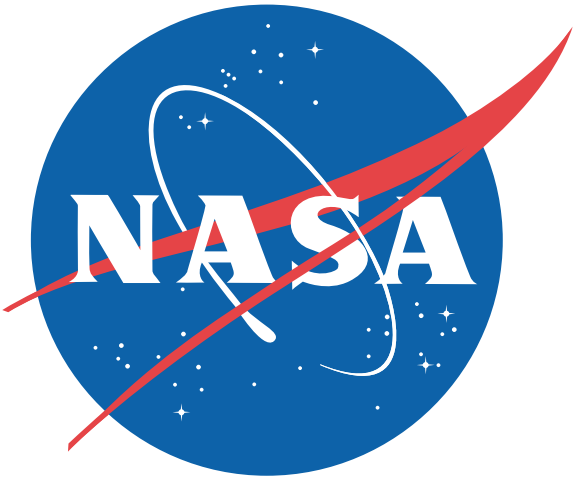

National Aeronautics and
Space Administration

February 14, 2003

NRA-03-OES-03

RESEARCH ANNOUNCEMENT

INTERDISCIPLINARY SCIENCE IN THE NASA EARTH SCIENCE ENTERPRISE

Notice of Intent due – March 14, 2003
Proposals due – May 1, 2003

OMB Approval No. 2700-0087

INTERDISCIPLINARY SCIENCE IN THE NASA EARTH SCIENCE ENTERPRISE

NASA Research Announcement
Soliciting Research Proposals
for
Period Ending
May 1, 2003

NRA-03-OES-03
Issued February 14, 2003

Office of Earth Science
National Aeronautics and Space Administration
Washington, DC 20546

The National Aeronautics and Space Administration (NASA) announces the solicitation of proposals for researchers to participate in NASA Earth Science Enterprise (ESE) Earth Observing System (EOS) interdisciplinary research and analysis activities. Proposals should contain cross-cutting, interdisciplinary research spanning and integrating across discipline areas addressed by the Enterprise.

I. INTRODUCTION

The NASA vision is:
To improve life here
To extend life to there
To find life beyond

The NASA mission is:
To understand and protect our home planet
To explore the Universe and search for life
To inspire the next generation of explorers

…as only NASA can.

ESE is one of five NASA Enterprises seeking to fulfill the agency's vision and carry out its mission. To understand and protect our home planet, we require scientific knowledge of how the Earth is changing and the consequences of these changes for life. The ESE mission is to develop a scientific understanding of the Earth system and its responses to natural or human-induced changes in order to improve prediction of climate, weather and natural hazards. Thus, the ESE research program aims to acquire a deeper scientific understanding of the components of the Earth system and their interactions. These interactions occur on a continuum of spatial and temporal scales ranging from short-term weather to long-term climate scales, and from local and regional to global scales.

II. GOALS AND BACKGROUND OF THIS NASA RESEARCH ANNOUNCEMENT (NRA)

This announcement offers opportunities for researchers to initiate new and successor interdisciplinary research investigations within ESE's EOS Interdisciplinary Science Program (EOS/IDS). Research investigations proposed should aim to advance our understanding of Earth system variability, the forcing factors that impact the Earth system, the mechanisms by which and the manner in which the Earth responds to forcing, and the local and regional consequences of global environmental change. They should also improve our capability for predicting the evolution of the Earth system in both a prognostic and retrospective sense. NASA's EOS/IDS investigations should be based on an approach that integrates more than one of the traditional Earth science disciplines and encourages innovation and complementary use of models and data from multiple satellites and sensors. EOS/IDS investigations should make use of a combination of space-based remote sensing data, regional and/or global models, and, where necessary,

data from sub-orbital platforms to address the intended scientific questions. Specific topics of interest are contained in section III below.

Since its initiation more than a decade ago, NASA's EOS/IDS program element has advanced the ESE goal of understanding the Earth system. EOS/IDS investigations have been focused primarily on developing understanding of interactive Earth system processes, Earth system model development, training the next generation of interdisciplinary scientists and developing the necessary infrastructure to take full advantage of EOS data as they become available. Prior to the launch of EOS satellites, many of these investigations made use of precursor data sets. Together, these interdisciplinary projects were intended to establish a scientific foundation for exploitation of data from the new satellite sensors of the EOS program and to make progress toward developing interactively coupled Earth System models that capture atmosphere-ocean-land-biosphere interactions across a range of space and time scales. In January, 2000, the most recent selection of EOS/IDS investigations was announced. The NRA to which these proposals responded (NRA-99-MDAR-04) called for investigations that focused on data analysis and modeling, with an emphasis on furthering the understanding of interdisciplinary Earth System processes on regional to global scales.

The purpose of this solicitation is to (1) exploit the vast wealth of new data from EOS and related satellites in interdisciplinary research on interactions among components of the Earth system; (2) promote interdisciplinary research in topic areas of continued interest, particularly those identified as emerging science areas in the Strategic Plan of the U.S. Climate Change Science Program (http://www.climatescience.gov); and (3) pursue innovative interdisciplinary research in new topical areas. Results of research activities supported by this solicitation should also provide inputs for or promote the development of models that advance our understanding of important aspects of the Earth system.

III. NASA'S EARTH SCIENCE ENTERPRISE

The ESE Research Strategy for 2000-2010 (http://earth.nasa.gov/visions/researchstrat/Research_Strategy.htm) describes the Enterprise goal of obtaining a scientific understanding of the entire Earth system on a global scale. This goal involves several challenges. The first challenge is the characterization of the present state of the Earth system and the forcings that affect this Earth System in order to develop baseline information for research. A second challenge is the quantitative description of how the Earth system's component parts and interactions between them have evolved, how they function, and how they may be expected to continue to evolve on all time scales. A third challenge is to develop the capability to predict those changes that will occur in the future over seasonal, interannual, decadal, and even longer time scales, both naturally and in response to human activity. Advances in observing and information technologies, modeling, and other research activities are all required to fulfill the ESE long-term vision for Earth system prediction in the years from 2010 to 2020.

The strategic objective of the Enterprise is to provide scientific answers to the overarching question:

How is the Earth changing and what are the consequences for life on Earth?

The key research topics studied by ESE fall largely into three categories: forcings, responses, and the processes that link the two and provide feedback mechanisms. This conceptual approach applies to all research areas of NASA's Earth Science program. The scientific strategy to address this complex problem can be presented through five fundamental questions, each raising a wide range of cross-disciplinary scientific problems.

- ***How is the global Earth system changing?***
- ***What are the primary forcings of the Earth system?***
- ***How does the Earth system respond to natural and human-induced changes?***
- ***What are the consequences of change in the Earth system for human civilization?***
- ***How well can we predict future changes in the Earth system?***

While these five questions define a logical progression in the study of global change, each one covers a range of topics too broad to serve as a simple guide for program implementation. For the purpose of this announcement, more specific research questions are presented below and are articulated in the ESE Research Strategy for 2000-2010. The specific scientific questions identified below are priorities for this announcement. These questions are the complete set of scientific research topics solicited by this NRA, and no priority should be construed from their relative order below. *New research into aerosols and their role in climate forcing should NOT be proposed in response to this NRA. A separate and recently concluded NRA (NRA-02-OES-06) entitled "Investigations that Contribute to the NASA Earth Science Enterprise's Multidisciplinary Research in Climate, Chemistry, and Global Modeling" was the proper vehicle for such research.*

- ***How are global ecosystems changing?***

Remote sensing-oriented research is sought to document and increase understanding of important changes in terrestrial, freshwater and marine ecosystems as they respond to the integrated effects of multiple stressors. NASA is particularly interested in research that characterizes and/or explains ecosystem structural or functional changes relevant to species richness and distributions as well as overall biotic health. Ideally, this work should provide inputs for existing ecological, biogeochemical, or biogeographical models and/or foster the development of such models. Types of studies of interest are those 1) using remote sensing to quantify habitat loss and fragmentation and the resulting impacts on the health of constituent species; 2) identifying environmental parameters, detected by or derived from remote sensing, that are important for estimating and understanding changes to marine, freshwater and/or terrestrial ecosystems and their constituent species; and 3) using satellite imagery and ecological models to discover why certain marine, freshwater and/or terrestrial habitats are susceptible to occupation by invasive species as

a step toward predicting the likely impacts of such invasions. A particular interest is the linkage of information across different spatial scales to take advantage of data products at the landscape, regional, and continental scales of remote sensing as well as the smaller spatial scales of many *in situ* ecosystem studies.

- ***What trends in atmospheric constituents and solar radiation are driving global climate?***

The atmospheric concentration of methane has increased by ~150% since 1750. Its annual growth rate slowed and became more variable in the 1990s, compared with the 1980s. New methane research under this solicitation should focus on explaining the interannual variability in the growth rate of methane over the past ~20 years. Studies are sought to evaluate and synthesize what we know about the mechanisms responsible for the production, destruction, and transport of methane. Such studies might address the role of permafrost degradation and increased warming of northern peatlands, land degradation and forest conversion to cattle pasture in the moist tropics, intensive land use practices and urbanization effects, and variability in its atmospheric transport and its chemical loss through reaction with the hydroxyl radical. Studies to model sources and sinks and the processes controlling them as well as the fate of methane in the atmosphere are desired. Studies that confront state-of-the-art models with the best available data sets, either as input data sets or as data for evaluation purposes, are of special interest. These research studies should work towards a goal of comparing results to the observed changes in the distributions of methane. Research that advances toward a predictive capability is an ultimate goal. NASA wishes to assemble a team of methane investigators that will work toward an assessment of our knowledge of changes in global atmospheric methane concentrations during their third year of research. Proposers should include in their budget resources for participation in this scientific assessment activity.

- ***How is global sea level affected by climate change?***

Coordinated investigations are encouraged that will reduce uncertainty in the assessment of present sea level changes and enable accurate predictions of future changes in sea level on regional and global scales. Doing so will require advancing our understanding of the interactions between the ice, oceans, and the solid earth, and how these components of the Earth system respond to a changing climate. Issues of specific interest include: 1) assessment of sea level measurements to determine annual and decadal accuracy for the rate and acceleration of sea level change including tide gauges, reference frame, ocean, ice, and coastal zone altimetry and gravity; 2) multi-decadal estimation and prediction for the changes in mass and density of the oceans as the principal components of sea level change; 3) assessment of and predictions for the decadal scale contributions of glaciers and ice sheets to sea level change; 4) scientific assessment of current terrestrial water storage and the extent to which it is likely to change; and 5) scientific assessment and prediction of regional components of forcings and response to sea level change on coastal zones such as lithospheric loading, temporal geoid variability, land subsidence and

erosion, and ocean dynamics. Investigations that integrate some or all of these components into an assessment that will reduce uncertainty in sea level projections are of particular interest. It is expected that full use will be made of current and historical satellite and airborne remote sensing data. NASA wishes to assemble a team of sea level investigators that will work toward a scientific assessment of our knowledge of and predictive capability for changes in global sea level during their third year of research. Proposers should include in their budget resources for participation in this assessment activity.

- ***How are variations in local weather, precipitation and water resources related to global climate variation?***

Changes in land cover and land use are closely related to hydrologic processes at the land surface. Projects may be proposed to carry out studies utilizing remote sensing data to advance our understanding of land-cover and land-use change as they relate to land surface hydrologic response over a range of space and time scales. Such studies will consider the relationship between regional vulnerability and land-cover and land-use change impacts on flood frequency, drought susceptibility, and changes in water quality. Remote sensing oriented research is sought to help in investigating: 1) how the effects of human activity on the landscape, its ecology, and the resulting changes in hydrology can be distinguished from the corresponding changes associated with natural climate variability and 2) how changes in land cover/land use can affect local meteorological and hydrologic processes as related to precipitation, water availability, and water quality. Research proposed under this topic should contribute to the development and/or evaluation of regional and global climate models, especially those that are used in scientific assessment. Particularly important is the ability of these types of models to represent accurately the relationship and interaction between hydrological processes and either vegetation processes or land cover/land use change or both. This can be explored through study of water cycle variables (e.g., precipitation, soil moisture, runoff) as well as trends in these variables.

- ***What are the consequences of climate and sea level changes and increased human activities on coastal regions?***

Up to 40% of the Earth's human population lives on or near the coast. In the U.S. about half the population will soon be living in the coastal zone. The coastal zone provides land for urban development, tourism, agriculture, industry and transportation as well as a location for leisure and recreational activities. Water plays an important role in transporting and redistributing particulates and solutes and remote sensing can be used to collect data to establish baselines for impacts and forecast trends and changes. Studies are solicited for using remotely sensed data to investigate how changes in climate and changes in land cover, land use, atmospheric composition and agricultural and industrial practices impact the physical and biological state of coastal regions and the provision of goods and services. Issues of specific interest include: 1) interdisciplinary and

disciplinary approaches that investigate the fluxes of particulates and solutes from the land, ocean, rivers, wetlands and the atmosphere and the mechanisms that control their transport and transformation processes, 2) impacts of enhanced nutrient inputs causing hypoxia or anoxia and blooms of toxic algae known as harmful algal blooms or HABs, 3) impacts of climate change and the related sea-level changes that may affect the physical and biological state of coastal regions, and 4) impacts of the occurrence and distribution of extreme events, such as storms, on: the flux of materials through rivers, sea level changes, and atmospheric deposition.

- ***How well can long-term climate trends be assessed or predicted?***

The polar regions, particularly the Arctic, are especially sensitive to changes in climate, and models consistently predict future warming to be much more significant in these regions than in their mid-latitude and equatorial counterparts. This sensitivity arises primarily from the positive albedo feedbacks associated with melting of the snow and ice that blankets most of the region, and the insulating effects of sea ice which modulate the exchange of energy, moisture, and momentum between the ocean and the atmosphere. Moreover, the formation and disappearance of sea ice cover play an important role in ocean circulation, particularly the Atlantic thermohaline circulation in the northern hemisphere and the formation of Antarctic bottom water in the southern hemisphere. Additional factors that influence ocean circulation in polar regions are high latitude precipitation and freshwater discharge from melting snow and ice. Investigations are encouraged that will help improve our knowledge of the feedback processes involving changes in polar regions. Particular areas of interest are: 1) advancing our understanding of the coupling between ice at the Earth's surface and the terrestrial and solar radiation that helps determine the Earth's climate, 2) improving the representation of high-latitude processes in climate models, and 3) reducing uncertainty in predictions of how climate changes in polar regions will influence ocean circulation. Investigations selected that support NASA's role in investigating Arctic feedbacks will also represent a contribution to the interagency initiative, SEARCH (Study of Environmental ARctic CHange). For more information on SEARCH, refer to http://psc.apl.washington.edu/search/.

- ***How well can cycling of carbon through the Earth system be modeled, and how reliable are predictions of future atmospheric concentrations of carbon dioxide and methane by these models?***

Carbon cycle modeling research should focus on advancing our ability to integrate various modeling approaches to carbon cycling and to couple terrestrial ecosystem, oceanic, and atmospheric models to help move us along the path towards more fully coupled Earth system models. Such models will need to relate the representation of the biosphere, especially the exchanges of carbon among the atmosphere, oceans, and terrestrial ecosystems, to global circulation systems. New models that provide either diagnostic or predictive capability for surface-atmosphere fluxes or for the near-term (decades to centuries) evolution of carbon sinks are of great interest. Model-data fusion

studies that combine observations from satellites and complementary sources, as required, are also of interest. We encourage the development of new classes of models that use satellite observations and could build upon, and complement current top-down (inverse models) and bottom-up (ecosystem models) modeling. Studies to couple biogeochemical and process models to general circulation models (GCMs) or ocean circulation models are also of interest. We expect the carbon cycle modeling work to be carried out to make important and/or extensive use of remotely sensed data.

IV. GUIDANCE FOR PROPOSERS

A. Level of Funding Available

Approximately $36 million is available over a three-year time period for research in the areas solicited above for interdisciplinary science investigations. NASA will consider a wide range of study sizes that emphasize the interdisciplinary nature of the Earth system and focus on large regional and global scales; however, annual budgets should not exceed $800,000. Funds are not currently available for awards under this NRA. The Government's obligation to make award(s) is contingent upon the availability of appropriated funds from which payment can be made and the receipt of proposals that NASA determines are acceptable for award under this NRA.

B. Commercially Available Data Sets

NASA's Earth Science Enterprise has adopted commercial data purchases as a mainstream way of acquiring research-quality data, as these commercial capabilities become available. NASA encourages the use of commercially available data sets by Principal Investigators as long as they meet scientific requirements and are cost-effective. When responding to this NRA, the proposer should identify the commercial data sources intended for use and the associated cost. Costs for any other types of required data should also be identified in the budget request.

C. Eligibility

Participation in this interdisciplinary research opportunity is open to all categories of domestic and foreign organizations, including educational institutions, industry, non-profit institutions, NASA research centers, and other government agencies and laboratories (including Federally Funded Research and Development Centers).

Participation by non-U.S. institutions must be proposed within the specific guidelines described in Appendix B, sections (l) and (m), which include a no-exchange-of-funds provision.

D. Proposal Submission and Review

Notice of Intent to Propose

All prospective proposers are requested to submit a notice of intent (NOI) to propose to NASA in response to this announcement by no later than March 14, 2003. This NOI will be used to expedite the NASA planning for peer review. Proposers are strongly encouraged to submit their NOI electronically by following the instructions in Appendix F. If this is not possible, NASA will accept a FAX copy containing the information described in Appendix F and sent to (202) 479-0511.

Proposal Content and Format

The proposal should be self-contained, and should not refer reviewers to external sources or web-sites for critical information. Proposals may be a maximum of fifteen pages of text, single-spaced, 12-pt type. Details on the proposal format, content, and order of materials are provided in Appendix A and Appendix B. Proposers are urged to read the information in these appendices carefully and to follow the specific guidelines.

Period of Performance

Proposals will be considered for periods of performance of up to three years. Projects may be partially funded within fiscal years (i.e., incremental funding) to minimize uncosted carry over.

Review Process

Proposals will be subjected to a full peer review including external reviewers, which may involve a mail review, a panel review, or both. This will be followed by a programmatic review in which NASA managers will assess program balance across the competitive range of proposals and evaluate any logistical, implementation, cost, and/or management concerns. The evaluation criteria to be used are listed in Appendix A. Final decisions will be made promptly and proposers will be notified either by electronic mail or surface mail, or both.

Proposal Submission Dates

Proposals may be submitted at any time during the period ending at 4:30 p.m., EDT, on May 1, 2003.

A complete schedule for this opportunity is given below:

Notice of Intent to propose due: 4:30 p.m., EST, March 14, 2003

Proposals due:	4:30 p.m., EDT, May 1, 2003
Peer Review:	mid-June, 2003
Announcement of Final Selections:	September, 2003

E. Additional Information

Appendix A provides amendatory guidance to the general guidelines for responding to NASA Research Announcements, contained in Appendix B, specific to this interdisciplinary research program, information on required proposal format and content, and the proposal evaluation criteria. Appendix B contains instructions for foreign participation in this opportunity. Appendices C and D contain information about and a sample proposal cover sheet with required institutional declarations in Appendix D. Appendix E contains the budget summary form. If electronic access is not available to prospective proposers, a hard copy of relevant reference(s) can be requested by calling (202) 479-9030 and leaving a voice mail message. Please leave your full name and address, including zip code, and your telephone number, including area code. Appendix F provides instructions for submitting notices of intent to propose electronically. *Prospective investigators are urged to read the information in all of the appendices carefully and to follow completely the specific guidelines therein.*

The following items apply only to this announcement.

Identifier:	NRA-03-OES-03
Submit Proposals to:	IDS 2003 NASA Peer Review Services, Code Y 500 E Street, SW Suite 200 Washington, DC 20024-2760

For overnight mail delivery purposes only, the recipient telephone number is (202) 479-9030.

Number of Copies Required:	20
NASA Selecting Official:	Director, Research Division Office of Earth Science

Obtain Additional Information from:

(for the question "How are global ecosystems changing?")
Mr. Woody Turner
Mail Code YS

NASA Headquarters
Washington, DC 20546-0001
Telephone: (202) 358-1662
FAX: (202) 358-2770
Woody.Turner@hq.nasa.gov

(for the question on trends in atmospheric constituents and solar radiation, i.e. the methane question and also the question on carbon cycle modeling)
Dr. Diane Wickland
Mail Code YS
NASA Headquarters
Washington, DC 20546-0001
Telephone: (202) 358-0245
FAX: (202) 358-2770
Diane.Wickland@hq.nasa.gov

(for the question "How is global sea level affected by climate change?")
Dr. Waleed Abdalati
Mail Code YS
NASA Headquarters
Washington, DC 20546-0001
Telephone: (202) 358-0746
FAX: (202) 358-2770
Waleed.Abdalati@hq.nasa.gov

or

Dr. John LaBrecque
Mail Code YS
NASA Headquarters
Washington, DC 20546-0001
Telephone: (202) 358-1373
FAX: (202) 358-2770
jlabrecq@mail.hq.nasa.gov

(for the question relating changes in land cover and land use to hydrological processes)
Dr. Jared Entin
Mail Code YS
NASA Headquarters
Washington, DC 20546-0001
Telephone: (202) 358-0275
FAX: (202) 358-2770
Jared.Entin@hq.nasa.gov

or

Dr. Garik Gutman
Mail Code YS
NASA Headquarters
Washington, DC 20546-0001
Telephone: (202) 358-0276
FAX: (202) 358-2770
Garik.Gutman@hq.nasa.gov

(for the question on the consequences of various changes for coastal regions)
Dr. Chuck Trees
Mail Code YS
NASA Headquarters
Washington, DC 20546-0001
Telephone: (202) 358-0310
FAX: (202) 358-2770
ctrees@hq.nasa.gov

or

Dr. Garik Gutman
Mail Code YS
NASA Headquarters
Washington, DC 20546-0001
Telephone: (202) 358-0276
FAX: (202) 358-2770
Garik.Gutman@hq.nasa.gov

(for the question on long-term climate trends and the polar regions)
Dr. Waleed Abdalati
Mail Code YS
NASA Headquarters
Washington, DC 20546-0001
Telephone: (202) 358-0746
FAX: (202) 358-2770
Waleed.Abdalati@hq.nasa.gov

Finally, prospective proposers are advised that safety is a top priority for all of NASA's programs. Safety is the freedom from those conditions that can cause death, injury, occupational illness, damage to or loss of equipment or property, or damage to the environment. NASA's safety priority is to protect: (1) the public, (2) astronauts and pilots, (3) the NASA work force (including employees working under NASA award instruments), and (4) high-value equipment and property.

Your interest and cooperation in participating in this opportunity are appreciated.

Ghassem R. Asrar
Associate Administrator for
Earth Science

Enclosures:
Appendix A - Amendatory Guidance to the General Guidelines Contained in Appendix B and Applicable Only to this NRA and Instructions for Proposers
Appendix B - Instructions for Responding to NASA Research Announcements
Appendix C - Required Proposal Cover Page
Appendix D - Proposal Cover Page, Assurance of Compliance, and Certifications
Appendix E - Budget Summary Sheet and Instructions
Appendix F - Notice of Intent to Propose

APPENDIX A
AMENDATORY GUIDANCE TO THE GENERAL GUIDELINES CONTAINED IN APPENDIX B AND APPLICABLE ONLY TO THIS NRA AND INSTRUCTIONS FOR PROPOSERS

I. PURPOSE

These guidelines contain general and specific information regarding the submission of proposals in response to this NRA. Formats for submission of proposals for research related to this program are provided. The evaluation criteria are specified. Appendix B contains general instructions for responding to NRAs. Where conflicts exist between this Appendix and Appendix B, this appendix shall be the controlling document.

II. PROPOSAL CONTENT AND FORMAT

The proposal should provide sufficient detail to enable a reviewer to assess the value of the proposed research, its relation to the objectives of the NRA, and the probability that the investigators will be able to accomplish the stated objectives within the requested resources and schedule. Capabilities of the proposing organizations should be described including the experience of the Principal Investigator and any Co-Investigators. The technical part of the proposal is to be limited to the equivalent of 15 pages of text, single-spaced, with type no smaller than 12 pt. A reasonable number of figures and tables (not to exceed 4 pages) may be appended. Short resumes (no more than 1-2 pages per investigator) and statements of current and pending research funding (including proposal name, funding agency, duration, and total funding) for all investigators should be included. The cover sheet, table of contents, abstract, list of references, management plan, cost plan, resumes, and statements of current and pending funding need not count in the 15-page limit. The proposal should be self-contained, and should not refer reviewers to external sources or web-sites for critical information. If color is used, proposers should ensure that all copies have color. To facilitate recycling, proposals should not be bound or in covers.

A. Page Limits

Offerors must adhere to the following page limits:

Cover Letter	1
Cover Page	1 - 2
Table of Contents	1
Abstract	1
Technical Plan	15
List of References	1 - 2
Management Plan	1/2 – 2
Cost Plan	3 - 8

Current and Pending Research	1 – 2 per investigator
Resumes	1 - 2 per investigator
Other	As few as possible

B. Content

Each proposal should contain the following materials assembled in the order given.

1. Cover Letter. Each proposal should be prefaced by a cover letter signed by an official of the investigator's institution who is authorized to legally bind the organization to the proposal and its content (unless the signature appears on the proposal itself). The cover letter should refer to the IDS 2003 NRA.

2. Proposal Cover Page. Please see Appendices C and D.

3. Table of Contents. A table of contents listing the page numbers for key sections of the proposal, including the cost and management plans, should be provided.

4. Abstract (length must not exceed 1 page). The abstract should summarize the research proposed in one page or less. It should contain a simple, concise overview of the investigation, its objectives, its scientific approach, expected results, and the value of its results to NASA's interdisciplinary research program. It is very important that this abstract be specific and accurately represent the research to be conducted.

5. Technical Plan (length must not exceed 15 pages). The main body of the proposal should contain a full statement of the research to be undertaken and should describe key background, objectives, scientific relevance, technical approach, and expected significance of the work. The key elements of the project should be clearly identified and related to each other. The methods or approaches to be used should be described, and, as appropriate, the advantages of the selected methods or approaches over alternatives should be discussed. The anticipated results should be identified and their relation to the proposal's stated objectives and NASA's objectives, as outlined in the NRA, should be discussed. The research should be described in sufficient detail that peer reviewers can adequately assess the scientific methods and quality of the work proposed. Where resources from satellites or other data sources (e.g., aircraft sensors) are required, proposals should indicate whether a commitment has been made for access to the other systems or whether the required/desired data are available. The costs for such data should be included in the cost plan. The plan should also describe how any data products to be created or additional, ancillary data sets to be obtained will be shared with NASA, other investigators, and the broader scientific and user communities.

6. References (1-2 pages). A complete list of references cited in the technical plan must be provided. Each reference should include the title, names of all authors, book or journal, volume number, page numbers, and year of publication. While it is important to be concise, proposers should follow accepted scholarly practices in providing citations for source materials relied upon when preparing any section of the proposal.

7. Management Plan (recommended length: 1/2 - 2 pages, depending on complexity). The Management Plan should outline the roles and responsibilities of all investigators and collaborators and indicate the relationships among these roles and responsibilities within the group. The management plan should also identify what contractor and/or non-institutional support is anticipated and who will be providing it. A schedule for reporting results and publishing papers should be described.

8. Cost Plan for U.S. Proposals Only. Please see Appendix B for specific guidance and Appendix E for forms. Contributions from any cost-sharing plan or other support for the proposed research should be detailed.

Costs for the acquisition, purchase, storage, or processing of all required data should be included. Also, costs for modeling, if proposed, should include all aspects of the process from writing software through computer operations and time. If use of NASA or other supercomputer resources is anticipated, an estimate of computational requirements should be included as part of the budget submission. Full costs for the purchase of data from commercial sources should be included in the budget and the requirement documented in the proposal.

To ensure adequate communications between investigators, proposers should plan for funds for two NASA-related meetings of three days duration and located in the U.S. during the course of their research.

9. Summary of Current and Pending Funding. A list of current and pending research funding, to include the proposal name, funding agency, duration of research project, and total funding level, for all investigators should be included.

10. Resumes. Brief resumes (1-2 pages) for all named investigators should be appended to the proposal.

11. Other Enclosures. Proposers may include other materials such as preprints or reprints of relevant publications, background on new measurement or analysis approaches, or letters of support and/or participation by scientists and/or institutions. Such materials are considered ancillary. Information in the Technical Plan of the proposal should stand alone. Other materials will not be evaluated.

III. SELECTION PROCESS AND EVALUATION CRITERIA

The review of proposals submitted under this NRA will consist of a full peer review including external reviewers, which may involve a mail review, a panel review, or both.

A. Evaluation Criteria.

The criteria listed below will be used in evaluating individual proposals. These criteria supersede those listed in section (i) of Appendix B, and are of approximately equal importance.

1. The intrinsic merits of the investigation, including:

(a) the overall scientific or technical merit of the proposal or unique and innovative methods, approaches, or concepts demonstrated by the proposal.

(b) the qualifications, capabilities, and relevant experience of the Principal Investigator and any Co-Investigators or collaborators as an indication of their ability to carry the investigation to a successful conclusion within the requested resources, including timely publication of peer-reviewed journal articles.

(c) the adequacy of facilities and ability and commitment of the investigator's institution to provide the necessary support to ensure that the investigation can be completed satisfactorily.

2. The relevance and responsiveness of the proposed research to the goals and objectives of ESE and to the goals and objectives described in this NRA, including:

(a) the probability of achieving one or more significant objectives directly relevant to one or more of the topics identified in this NRA.

(b) the interdisciplinary nature of the proposed research, in particular, its probability of succeeding in addressing scientific questions pertaining to more than one traditional Earth science discipline.

3. The cost of the investigation, including consideration of the realism and reasonableness of the proposed cost, the relationship of the proposed cost to available funds, and the potential value of the validation approach(es) (i.e., cost/benefit) to the user community.

B. Other Considerations

NASA reserves the right to select and make an award covering only a portion of a proposer's investigation, in which case the investigator will be given the opportunity to accept or decline such partial acceptance. In cases in which two or more proposals address similar problems and/or adopt similar approaches to data analysis, NASA may

desire joint participation on the part of two or more proposers in a single project. If such overlap involves more than one funding organization, NASA and those organizations will confer and mutually agree to the disposition of those proposals.

Final decisions will be made promptly and investigators will be notified by either electronic mail or surface mail, or both.

APPENDIX B
INSTRUCTIONS FOR RESPONDING TO NASA RESEARCH ANNOUNCEMENTS
(1852.235-72, OCTOBER 2002)

(a) **General.**

(1) Proposals received in response to a NASA Research Announcement (NRA) will be used only for evaluation purposes. NASA does not allow a proposal, the contents of which are not available without restriction from another source, or any unique ideas submitted in response to an NRA to be used as the basis of a solicitation or in negotiation with other organizations, nor is a pre-award synopsis published for individual proposals.

(2) A solicited proposal that results in a NASA award becomes part of the record of that transaction and may be available to the public on specific request; however, information or material that NASA and the awardee mutually agree to be of a privileged nature will be held in confidence to the extent permitted by law, including the Freedom of Information Act.

(3) NRAs contain programmatic information and certain requirements which apply only to proposals prepared in response to that particular announcement. These instructions contain the general proposal preparation information which applies to responses to all NRAs.

(4) A contract, grant, cooperative agreement, or other agreement may be used to accomplish an effort funded in response to an NRA. NASA will determine the appropriate award instrument. Contracts resulting from NRAs are subject to the Federal Acquisition Regulation and the NASA FAR Supplement. Any resultant grants or cooperative agreements will be awarded and administered in accordance with the NASA Grant and Cooperative Agreement Handbook (NPG 5800.1).

(5) NASA does not have mandatory forms or formats for responses to NRAs; however, it is requested that proposals conform to the guidelines in these instructions. NASA may accept proposals without discussion; hence, proposals should initially be as complete as possible and be submitted on the proposers' most favorable terms.

(6) To be considered for award, a submission must, at a minimum, present a specific project within the areas delineated by the NRA; contain sufficient technical and cost information to permit a meaningful evaluation; be signed by an official authorized to legally bind the submitting organization; not merely offer to perform standard services or to just provide computer facilities or services; and not significantly duplicate a more specific current or pending NASA solicitation.

(b) **NRA-Specific Items.** Several proposal submission items appear in the NRA itself: the unique NRA identifier; when to submit proposals; where to send proposals; number of copies required; and sources for more information. Items included in these instructions may be supplemented by the NRA.

(c) The following information is needed to permit consideration in an objective manner. NRAs will generally specify topics for which additional information or greater detail is desirable. Each proposal copy shall contain all submitted material, including a copy of the transmittal letter if it contains substantive information.

(1) **Transmittal Letter or Prefatory Material.**

(i) The legal name and address of the organization and specific division or campus identification if part of a larger organization;

(ii) A brief, scientifically valid project title intelligible to a scientifically literate reader and suitable for use in the public press;

(iii) Type of organization: e.g., profit, nonprofit, educational, small business, minority, women-owned, etc.;

(iv) Name and telephone number of the principal investigator and business personnel who may be contacted during evaluation or negotiation;

(v) Identification of other organizations that are currently evaluating a proposal for the same efforts;

(vi) Identification of the NRA, by number and title, to which the proposal is responding;

(vii) Dollar amount requested, desired starting date, and duration of project;

(viii) Date of submission; and

(ix) Signature of a responsible official or authorized representative of the organization, or any other person authorized to legally bind the organization (unless the signature appears on the proposal itself).

(2) **Restriction on Use and Disclosure of Proposal Information.** Information contained in proposals is used for evaluation purposes only. Offerors or quoters should, in order to maximize protection of trade secrets or other information that is confidential or privileged, place the following notice on the title page of the proposal and specify the information subject to the notice by inserting an appropriate identification in the notice. In any event, information contained in proposals will be protected to the extent permitted by law, but NASA assumes no liability for use and disclosure of information not made subject to the notice.

Notice

Restriction on Use and Disclosure of Proposal Information

The information (data) contained in [insert page numbers or other identification] of this proposal constitutes a trade secret and/or information that is commercial or financial and confidential or privileged. It is furnished to the Government in confidence with the understanding that it will not, without permission of the offeror, be used or disclosed other than for evaluation purposes; provided, however, that in the event a contract (or other agreement) is awarded on the basis of this proposal the Government shall have the right to use and disclose this information (data) to the extent provided in the contract (or other agreement). This restriction does not limit the Government's right to use or disclose this information (data) if obtained from another source without restriction.

(3) **Abstract.** Include a concise (200-300 word if not otherwise specified in the NRA) abstract describing the objective and the method of approach.

(4) **Project Description.**

(i) The main body of the proposal shall be a detailed statement of the work to be undertaken and should include objectives and expected significance; relation to the present state of knowledge; and relation to previous work done on the project and to related work in progress elsewhere. The statement should outline the plan of work, including the broad design of experiments to be undertaken and a description of experimental methods and procedures. The project description should address the evaluation factors in these instructions and any specific factors in the NRA. Any substantial collaboration with

individuals not referred to in the budget or use of consultants should be described. Subcontracting significant portions of a research project is discouraged.

(ii) When it is expected that the effort will require more than one year, the proposal should cover the complete project to the extent that it can be reasonably anticipated. Principal emphasis should be on the first year of work, and the description should distinguish clearly between the first year's work and work planned for subsequent years.

(5) **Management Approach.** For large or complex efforts involving interactions among numerous individuals or other organizations, plans for distribution of responsibilities and arrangements for ensuring a coordinated effort should be described.

(6) **Personnel.** The principal investigator is responsible for supervision of the work and participates in the conduct of the research regardless of whether or not compensated under the award. A short biographical sketch of the principal investigator, a list of principal publications and any exceptional qualifications should be included. Omit social security number and other personal items which do not merit consideration in evaluation of the proposal. Give similar biographical information on other senior professional personnel who will be directly associated with the project. Give the names and titles of any other scientists and technical personnel associated substantially with the project in an advisory capacity. Universities should list the approximate number of students or other assistants, together with information as to their level of academic attainment. Any special industry-university cooperative arrangements should be described.

(7) **Facilities and Equipment.**

(i) Describe available facilities and major items of equipment especially adapted or suited to the proposed project, and any additional major equipment that will be required. Identify any Government-owned facilities, industrial plant equipment, or special tooling that are proposed for use. Include evidence of its availability and the cognizant Government points of contact.

(ii) Before requesting a major item of capital equipment, the proposer should determine if sharing or loan of equipment already within the organization is a feasible alternative. Where such arrangements cannot be made, the proposal should so state. The need for items that typically can be used for research and non-research purposes should be explained.

(8) **Proposed Costs (U.S. Proposals Only).**

(i) Proposals should contain cost and technical parts in one volume: do not use separate "confidential" salary pages. As applicable, include separate cost estimates for salaries and wages; fringe benefits; equipment; expendable materials and supplies; services; domestic and foreign travel; ADP expenses; publication or page charges; consultants; subcontracts; other miscellaneous identifiable direct costs; and indirect costs. List salaries and wages in appropriate organizational categories (e.g., principal investigator, other scientific and engineering professionals, graduate students, research assistants, and technicians and other non-professional personnel). Estimate all staffing data in terms of staff-months or fractions of full-time.

(ii) Explanatory notes should accompany the cost proposal to provide identification and estimated cost of major capital equipment items to be acquired; purpose and estimated number and lengths of trips planned; basis for indirect cost computation (including date of most recent negotiation and cognizant agency); and

clarification of other items in the cost proposal that are not self-evident. List estimated expenses as yearly requirements by major work phases.

(iii) Allowable costs are governed by FAR Part 31 and the NASA FAR Supplement Part 1831 (and OMB Circulars A-21 for educational institutions and A-122 for nonprofit organizations).

(iv) Use of NASA funds--NASA funding may not be used for foreign research efforts at any level, whether as a collaborator or a subcontract. The direct purchase of supplies and/or services, which do not constitute research, from non-U.S. sources by U.S. award recipients is permitted. Additionally, in accordance with the National Space Transportation Policy, use of a non-U.S. manufactured launch vehicle is permitted only on a no-exchange-of-funds basis.

(9) **Security.** Proposals should not contain security classified material. If the research requires access to or may generate security classified information, the submitter will be required to comply with Government security regulations.

(10) **Current Support.** For other current projects being conducted by the principal investigator, provide title of project, sponsoring agency, and ending date.

(11) **Special Matters.**

(i) Include any required statements of environmental impact of the research, human subject or animal care provisions, conflict of interest, or on such other topics as may be required by the nature of the effort and current statutes, executive orders, or other current Government-wide guidelines.

(ii) Identify and discuss risk factors and issues throughout the proposal where they are relevant, and your approach to managing these risks.

(iii) Proposers should include a brief description of the organization, its facilities, and previous work experience in the field of the proposal. Identify the cognizant Government audit agency, inspection agency, and administrative contracting officer, when applicable.

(d) **Renewal Proposals.**

(1) Renewal proposals for existing awards will be considered in the same manner as proposals for new endeavors. A renewal proposal should not repeat all of the information that was in the original proposal. The renewal proposal should refer to its predecessor, update the parts that are no longer current, and indicate what elements of the research are expected to be covered during the period for which support is desired. A description of any significant findings since the most recent progress report should be included. The renewal proposal should treat, in reasonable detail, the plans for the next period, contain a cost estimate, and otherwise adhere to these instructions.

(2) NASA may renew an effort either through amendment of an existing contract or by a new award.

(e) **Length.** Unless otherwise specified in the NRA, effort should be made to keep proposals as brief as possible, concentrating on substantive material. Few proposals need exceed 15-20 pages. Necessary detailed information, such as reprints, should be included as attachments. A complete set of attachments is necessary for each copy of the proposal. As proposals are not returned, avoid use of "one-of-a-kind" attachments.

(f) **Joint Proposals.**

(1) Where multiple organizations are involved, the proposal may be submitted by only one of them. It should clearly describe the role to be played by the other organizations and

indicate the legal and managerial arrangements contemplated. In other instances, simultaneous submission of related proposals from each organization might be appropriate, in which case parallel awards would be made.

(2) Where a project of a cooperative nature with NASA is contemplated, describe the contributions expected from any participating NASA investigator and agency facilities or equipment which may be required. The proposal must be confined only to that which the proposing organization can commit itself. "Joint" proposals which specify the internal arrangements NASA will actually make are not acceptable as a means of establishing an agency commitment.

(g) **Late Proposals.** Proposals or proposal modifications received after the latest date specified for receipt may be considered if a significant reduction in cost to the Government is probable or if there are significant technical advantages, as compared with proposals previously received.

(h) **Withdrawal.** Proposals may be withdrawn by the proposer at any time before award. Offerors are requested to notify NASA if the proposal is funded by another organization or of other changed circumstances which dictate termination of evaluation.

(i) **Evaluation Factors.**

(1) Unless otherwise specified in the NRA, the principal elements (of approximately equal weight) considered in evaluating a proposal are its relevance to NASA's objectives, intrinsic merit, and cost.

(2) Evaluation of a proposal's relevance to NASA's objectives includes the consideration of the potential contribution of the effort to NASA's mission.

(3) Evaluation of its intrinsic merit includes the consideration of the following factors of equal importance:

(i) Overall scientific or technical merit of the proposal or unique and innovative methods, approaches, or concepts demonstrated by the proposal.

(ii) Offeror's capabilities, related experience, facilities, techniques, or unique combinations of these which are integral factors for achieving the proposal objectives.

(iii) The qualifications, capabilities, and experience of the proposed principal investigator, team leader, or key personnel critical in achieving the proposal objectives.

(iv) Overall standing among similar proposals and/or evaluation against the state-of-the-art.

(4) Evaluation of the cost of a proposed effort may include the realism and reasonableness of the proposed cost and available funds.

(j) **Evaluation Techniques.** Selection decisions will be made following peer and/or scientific review of the proposals. Several evaluation techniques are regularly used within NASA. In all cases proposals are subject to scientific review by discipline specialists in the area of the proposal. Some proposals are reviewed entirely in-house, others are evaluated by a combination of in-house and selected external reviewers, while yet others are subject to the full external peer review technique (with due regard for conflict-of-interest and protection of proposal information), such as by mail or through assembled panels. The final decisions are made by a NASA selecting official. A proposal which is scientifically and programmatically meritorious, but not selected for award during its initial review, may be included in subsequent reviews unless the proposer requests otherwise.

(k) **Selection for Award.**

(1) When a proposal is not selected for award, the proposer will be notified. NASA will explain generally why the proposal was not selected. Proposers desiring additional information may contact the selecting official who will arrange a debriefing.

(2) When a proposal is selected for award, negotiation and award will be handled by the procurement office in the funding installation. The proposal is used as the basis for negotiation. The contracting officer may request certain business data and may forward a model award instrument and other information pertinent to negotiation.

(l) **Additional Guidelines Applicable to Foreign Proposals and Proposals Including Foreign Participation.**

(1) NASA welcomes proposals from outside the U.S. However, foreign entities are generally not eligible for funding from NASA. Therefore, unless otherwise noted in the NRA, proposals from foreign entities should not include a cost plan unless the proposal involves collaboration with a U.S. institution, in which case a cost plan for only the participation of the U.S. entity must be included. Proposals from foreign entities and proposals from U.S. entities that include foreign participation must be endorsed by the respective government agency or funding/sponsoring institution in the country from which the foreign entity is proposing. Such endorsement should indicate that the proposal merits careful consideration by NASA, and if the proposal is selected, sufficient funds will be made available to undertake the activity as proposed.

(2) All foreign proposals must be typewritten in English and comply with all other submission requirements stated in the NRA. All foreign proposals will undergo the same evaluation and selection process as those originating in the U.S. All proposals must be received before the established closing date. Those received after the closing date will be treated in accordance with paragraph (g) of this provision. Sponsoring foreign government agencies or funding institutions may, in exceptional situations, forward a proposal without endorsement if endorsement is not possible before the announced closing date. In such cases, the NASA sponsoring office should be advised when a decision on endorsement can be expected.

(3) Successful and unsuccessful foreign entities will be contacted directly by the NASA sponsoring office. Copies of these letters will be sent to the foreign sponsor. Should a foreign proposal or a U.S. proposal with foreign participation be selected, NASA's Office of External Relations will arrange with the foreign sponsor for the proposed participation on a no-exchange-of-funds basis, in which NASA and the non-U.S. sponsoring agency or funding institution will each bear the cost of discharging their respective responsibilities.

(4) Depending on the nature and extent of the proposed cooperation, these arrangements may entail:

(i) An exchange of letters between NASA and the foreign sponsor**;** or

(ii) A formal Agency-to-Agency Memorandum of Understanding (MOU).

(m) **Export Control Guidelines Applicable to Foreign Proposals and Proposals Including Foreign Participation.**

U.S. proposals including foreign participation must include a section discussing compliance with U.S. export laws and regulations, e.g., 22 CFR Parts 120-130 and 15 CFR Parts 730-774, as applicable to the circumstances surrounding the particular foreign participation. The discussion must describe in detail the proposed foreign participation and is to include, but not limited to, whether or not the foreign participation may require the

prospective proposer to obtain the prior approval of the Department of State or the Department of Commerce via a technical assistance agreement or an export license, or whether a license exemption/exception may apply. If prior approvals via licenses are necessary, discuss whether the license has been applied for or if not, the projected timing of the application and any implications for the schedule. Information regarding U.S. export regulations is available at http://www.pmdtc.org and http://www.bxa.doc.gov. Proposers are advised that under U.S. law and regulations, spacecraft and their specifically designed, modified, or configured systems, components, and parts are generally considered "Defense Articles" on the United States Munitions List and subject to the provisions of the International Traffic in Arms Regulations (ITAR), 22 CFR Parts 120-130.

(n) **Cancellation of NRA.** NASA reserves the right to make no awards under this NRA and to cancel this NRA. NASA assumes no liability for canceling the NRA or for anyone's failure to receive actual notice of cancellation.

APPENDIX C

Required Proposal Cover Page

Two steps are required to submit a cover page. The first step is to complete the proposal cover page (see SAMPLE Appendix D) **electronically** through the SYS-EYFUS Website located at **http://proposals.hq.nasa.gov/**. If the proposer has submitted an electronic Notice of Intent (Appendix F) to SYS-EYFUS, the same user UserID and password can be used to complete the electronic proposal cover page. If the proposer obtained a User ID and password in the process of submitting a proposal for a previous research opportunity announcement, the same user UserID and password can be used to complete the electronic proposal cover page in response to this research opportunity announcement. Be sure to click on "Edit Personal Information" if any of your correspondence information in SYS-EYFUS is not current.

The second step is to print a **hard copy** (see Appendix D) of the electronic cover page that must be signed by the Principal Investigator and an official by title of the investigator's organization who is authorized to commit the organization. This authorizing signature also certifies that the proposing institution has read and is in compliance with the required certifications printed in full, therefore, these certifications do not need to be submitted separately. This page will not be counted against the page limit of the proposal.

If you do not have a SYS-EYFUS UserID or password, you may obtain one electronically by going to **http://proposals.hq.nasa.gov** and performing the following steps:

a) Click the hyperlink for **new user** that will take you to the Personal Information Search Page.
b) Enter your first and last name. SYS-EYFUS will **search** for your record information in the SYS-EYFUS database.
c) Confirm your personal information by **choosing** the record displayed.
d) Select **continue**, and a User ID and password will be e-mailed to you.

Once you receive your User ID and Password, **login** to the SYS-EYFUS website and follow the instructions for **New Proposal Cover Page.**

Proposers without access to the web or who experience difficulty in using this site may contact the Help Desk at **proposals@hq.nasa.gov** (or call 202-479-9376) for assistance. After you have submitted your notice of intent or proposal cover page electronically, if you are unsure if it has been successfully submitted, **do not re-submit**. Please call the Help Desk. They will be able to promptly tell you if your submission has been received. Please note that submission of the electronic cover page does not satisfy the deadline for proposal submission.

APPENDIX D
Proposal Cover Page, Assurance of Compliance, and Certifications

Proposal Cover Page Proposal Number:

Date: __/___/_____ _____

Name of Submitting Institution: **Congressional District:**

Proposal Title:			
Name of Submitting Institution:		**Congressional Distinct:**	

Certification of Compliance with Applicable Executive Orders and US Code

By submitting the proposal identified in this *Cover Sheet/Proposal Summary* in response to this Research Announcement, the Authorizing Official of the proposing institution (or the individual proposer if there is no proposing institution) as identified below:

- certifies that the statements made in this proposal are true and complete to the best of his/her knowledge;
- agrees to accept the obligations to comply with NASA award terms and conditions if an award is made as a result of this proposal; and
- confirms compliance with all provisions, rules, and stipulations set forth in the two Certifications contained in this NRA [namely, (i) *Assurance of Compliance with the NASA Regulations Pursuant to Nondiscrimination in Federally Assisted Programs, and (ii) Certifications, Disclosures, And Assurances Regarding Lobbying and Debarment & Suspension*].

Willful provision of false information in this proposal and/or its supporting documents, or in reports required under an ensuing award, is a criminal offense (U.S. Code, Title 18, Section 1001).

NASA PROCEDURE FOR HANDLING PROPOSALS

This proposal shall be used and disclosed for evaluation purposes only, and a copy of this Government notice shall be applied to any reproduction or abstract thereof. Any authorized restrictive notices that the submitter places on this proposal shall also be strictly complied with. Disclosure of this proposal for any reason outside the Government evaluation purposes shall be made only to the extent authorized by the Government.

Principal Investigator Name:		**Authorized Institutional Official Name:**	
Organization:		**Organization:**	
Department:		**Department:**	
Mailing Address:		**Mailing Address:**	
City, State Zip:		**City, State Zip:**	
Telephone Number:		**Telephone Number:**	
Fax Number:		**Fax Number:**	
Email Address:		**Email Address:**	
Principal Investigator Signature:	_____	**Authorized Institutional Official Signature:**	_____
Date:	_____	**Date:**	_____

Co-Investigator:

Name	Telephone	Email	Institution	Address

Budget:

Year	Budget
1	
2	
3	
Total	

Assurance of Compliance with the NASA Regulations Pursuant to Nondiscrimination in Federally Assisted Programs

The *(Institution, corporation, firm, or other organization on whose behalf this assurance is signed, hereinafter called "Applicant ")* hereby agrees that it will comply with Title VI of the Civil Rights Act of 1964 (P.L. 88-352), Title IX of the Education Amendments of 1972 (20 U.S.C. 1680 et seq.), Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. 794), and the Age Discrimination Act of 1975 (42 U.S.C. 16101 et seq.), and all requirements imposed by or pursuant to the Regulation of the National Aeronautics and Space Administration (14 CFR Part 1250) (hereinafter called "NASA") issued pursuant to these laws, to the end that in accordance with these laws and regulations, no person in the United States shall, on the basis of race, color, national origin, sex, handicapped condition, or age be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity for which the Applicant receives federal financial assistance from NASA; and hereby give assurance that it will immediately take any measure necessary to effectuate this agreement.

If any real property or structure thereon is provided or improved with the aid of federal financial assistance extended to the Applicant by NASA, this assurance shall obligate the Applicant, or in the case of any transfer of such property, any transferee, for the period during which the real property or structure is used for a purpose for which the federal financial assistance is extended or for another purpose involving the provision of similar services or benefits. If any personal property is so provided, this assurance shall obligate the Applicant for the period during which it retains ownership or possession of the property. In all other cases, this assurance shall obligate the Applicant for the period during which the federal financial assistance is extended to it by NASA.

This assurance is given in consideration of and for the purpose of obtaining any and all federal grants, loans, contracts, property, discounts, or other federal financial assistance extended after the date hereof to the Applicant by NASA, including installment payments after such date on account of applications for federal financial assistance which were approved before such date. The Applicant recognizes and agrees that such federal financial assistance will be extended in reliance on the representations and agreements made in this assurance, and that the United States shall have the right to seek judicial enforcement of this assurance. This assurance is binding on the Applicant, its successors, transferees, and assignees, and the person or persons whose signatures appear on the Proposal Cover Sheet above are authorized to sign on behalf of the Applicant.

CERTIFICATIONS, DISCLOSURES, AND ASSURANCES
REGARDING LOBBYING AND DEBARMENT & SUSPENSION

1. LOBBYING

As required by Section 1352, Title 31 of the U.S. Code, and implemented at 14 CFR Part 1271, as defined at 14 CFR Subparts 1271.110 and 1260.117, with each submission that initiates agency consideration of such applicant for award of a Federal contract, grant, or cooperative agreement exceeding $ 100,000, the applicant must **certify** that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit a Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

2. GOVERNMENTWIDE DEBARMENT AND SUSPENSION

As required by Executive Order 12549, and implemented at 14 CFR 1260.510, for prospective participants in primary covered transactions, as defined at 14 CFR Subparts 1265.510 and 1260.117—

(1) The prospective primary participant **certifies** to the best of its knowledge and belief, that it and its principals:

(a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded by any Federal department or agency;

(b) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

(c) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (l)(b) of this certification; and

(d) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

(2) Where the prospective primary participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

APPENDIX E
BUDGET SUMMARY

For period from _____ to _____

• Provide a complete Budget Summary for year one and separate estimated summaries for each subsequent year.
• Enter the proposed estimated costs in Column A (Columns B & C for NASA use only).
• Provide as attachments detailed computations of all estimates in each cost category with narratives as required to fully explain each proposed cost. See *Instructions For Budget Summary* on following page for details.

		NASA USE ONLY	
	A	**B**	**C**
1. Direct Labor (salaries, wages, and fringe benefits)	_____	_____	_____
2. Other Direct Costs:			
a. Subcontracts	_____	_____	_____
b. Consultants	_____	_____	_____
c. Equipment	_____	_____	_____
d. Supplies	_____	_____	_____
e. Travel	_____	_____	_____
f. Other	_____	_____	_____
3. Indirect Costs*	_____	_____	_____
4. Other Applicable Costs	_____	_____	_____
5. SUBTOTAL--Estimated Costs	_____	_____	_____
6. Less Proposed Cost Sharing (if any)	_____	_____	_____
7. Carryover Funds (if any)			
a. Anticipated amount : _____			
b. Amount used to reduce budget	_____	_____	_____
8. Total Estimated Costs	_____	_____	XXXXXXX
9. APPROVED BUDGET	XXXXXX	XXXXXXX	_____

***Facilities and Administrative Costs.**

INSTRUCTIONS FOR BUDGET SUMMARY

1. Direct Labor (salaries, wages, and fringe benefits): Attachments should list the number and titles of personnel, amounts of time to be devoted to the grant, and rates of pay.

2. Other Direct Costs:
    a. Subcontracts: Attachments should describe the work to be subcontracted, estimated amount, recipient (if known), and the reason for subcontracting.
    b. Consultants: Identify consultants to be used, why they are necessary, the time they will spend on the project, and rates of pay (not to exceed the equivalent of the daily rate for Level IV of the Executive Schedule, exclusive of expenses and indirect costs).
    c. Equipment: List separately. Explain the need for items costing more than $5,000. Describe basis for estimated cost. General purpose equipment is not allowable as a direct cost unless specifically approved by the NASA Grant Officer. Any equipment purchase requested to be made as a direct charge under this award must include the equipment description, how it will be used in the conduct of the basic research proposed and why it cannot be purchased with indirect funds.
    d. Supplies: Provide general categories of needed supplies, the method of acquisition, and the estimated cost.
    e. Travel: Describe the purpose of the proposed travel in relation to the grant and provide the basis of estimate, including information on destination and number of travelers where known.
    f. Other: Enter the total of direct costs not covered by 2a through 2e. Attach an itemized list explaining the need for each item and the basis for the estimate.

3. Indirect Costs*****: Identify F&A cost rate(s) and base(s) as approved by the cognizant Federal agency, including the effective period of the rate. Provide the name, address, and telephone number of the Federal agency official having cognizance. If unapproved rates are used, explain why, and include the computational basis for the indirect expense pool and corresponding allocation base for each rate.

4. Other Applicable Costs: Enter total explaining the need for each item.

5. Subtotal-Estimated Costs: Enter the sum of items 1 through 4.

6. Less Proposed Cost Sharing (if any): Enter any amount proposed. If cost sharing is based on specific cost items, identify each item and amount in an attachment.

7. Carryover Funds (if any): Enter the dollar amount of any funds expected to be available for carryover from the prior budget period. Identify how the funds will be used if they are not used to reduce the budget. NASA officials will decide whether to use all or part of the anticipated carryover to reduce the budget (not applicable to 2nd-year and subsequent-year budgets submitted for award of a multiple year award).

8. Total Estimated Costs: Enter the total after subtracting items 6 and 7b from item 5.

* Facilities and Administrative (F&A) Costs

APPENDIX F

Notice of Intent to Propose

In order to plan for a timely and efficient peer review process, *Notices of Intent* (NOI's) to propose are strongly encouraged by the date given in this NRA. The submission of a NOI is not a commitment to submit a proposal, nor is information contained therein considered binding on the submitter. NOI's are to be submitted electronically by entering the requested information through SYS-EYFUS Web site located at **http://proposals.hq.nasa.gov/**.

User identifications (IDs) and passwords are required by NASA security policies in order to access the SYS-EYFUS Web site.

If the proposer obtained a User ID and password in the process of submitting a proposal for a previous research opportunity announcement, the same user UserID and password can be used to complete the electronic Notice of Intent to Propose in response to this research opportunity announcement.

If you do not have a SYS-EYFUS UserID or password, you may obtain one electronically by going to *http://proposals.hq.nasa.gov* and performing the following steps:

e) Click the hyperlink for **new user** that will take you to the Personal Information Search Page.
f) Enter your first and last name. SYS-EYFUS will **search** for your record information in the SYS-EYFUS database.
g) Confirm your personal information by **choosing** the record displayed.
h) Select **continue**, and a User ID and password will be e-mailed to you.

Once you receive your User ID and Password, **login** to the SYS-EYFUS Web site and follow the instructions for **New Notice of Intent.**

At a minimum, the following information will be requested:

- NRA number, alpha-numeric identifier, (Note: this may be included on the Web site template);
- the Principal Investigator's name, mailing address, phone number, and E-mail address;
- the name(s) of any Co-Investigator(s) and institution(s) known by the NOI due date;
- a descriptive title of the intended investigation; and,
- a brief description of the investigation to be proposed.

A separate NOI must be submitted for each intended proposal.